Simulation of Light Diffraction at Pixels of a Spatial Light Modulator
Abstract

The performance of diffractive optical elements can be affected by several different factors. Nowadays, SLMs are often employed as programmable diffractive optical elements. As an example, a Gaussian-to-top-hat diffractive beam shaper is implemented by using a SLM. Due to fabrication limitation, there is always gaps amongst the pixels of a SLM, which may cause undesired diffractions. Such effects are investigated in VirtualLab Fusion, and especially, the influence on the final beam shaping results is analyzed.
How is the beam shaping results influenced by the area filling factor of the SLM?

The area filling factor / pixel gaps varies from 60% to 100%.

SLM pixel array top view:

- pixel pitch 20x20µm
- area size 15.84x12mm
- tilt (w.r.t. optical axis) 10°
- loaded with Gaussian-to-top-hat transmission

Fourier lens

Laser source
- fundamental Gaussian
- wavelength 532nm
- diameter (waist) 6.6mm
Results

- Near field behind SLM

- amplitude of $E_x$

- phase of $E_x$

- wrapped phase (2$\pi$ steps)
Results

- Far field behind SLM

SLM with varying area fill factor $F$

amplitude (identical color scaling)

$F=60\%$  $F=70\%$  $F=80\%$  $F=90\%$  $F=100\%$
## Document Information

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